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The Pure-Emic User Interface Design Methodology for an Online Community Policing Hub

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Abstract

The pervasiveness of the internet and internet-ready devices has greatly facilitated the rapid and unprecedented adoption of online social networks and their attendant online communities. In this case, an online community is a group of people who are tied together by a common interest, purpose, goal, practice, etc. Hence, the centre of attraction to an online community is the interest, the purpose or the goal that the members share or will stand to achieve either collectively or individually. Online Community Hub (OCH) is a collaborative virtual platform on the web where the entire people, institutions, technologies, tools, resources and service delivery frameworks that are relevant for any community are made visible and accessible. Online Community Policing Hub (OCPH) is an Online Community Hub where the shared community interest, purpose or goal is community policing. The thrust of the work in this paper is to present a methodical approach to a community centered user interface design for an Online Community Policing Hub (OCPH). The paper presents a Pure-Emic User Interface Design (PEUID) approach underpinned by knowledge from various fields such as ergonomics, cognitive psychology, anthropology and software engineering in ensuring the well-being of the system users and the need for zero-training without deviations from the users' mental model of the system.

Keywords: Geo-Community, Online community, Community policing, Community Hub, Ergonomics, Anthropology, Software Engineering

1. Introduction

An Online Community Policing Hub (OCPH) is a collaborative virtual platform where all the people, institutions, technologies, tools and strategies that are relevant for effective community policing are made available and accessible. The conceptualisation of the OCPH is based on the Context Model Of Community Informatics Social Network System (CISNS) developed by Ozuomba et al., (2013). Community policing is a policing strategy that encourages active partnership between the law enforcement agencies and the community in devising strategic approach to minimize the rates of crimes in the community. According to Weigand (1997), "the police are the public and the public are the police; the police being only members of the public who are paid to give full time attention to duties which are incumbent on every citizen in the interest of community welfare and existence." The emergence of an OCPH is targeted at provided solutions to the underlying reasons for the non-involvement of the citizens in crime mitigation exercises. Among various reasons for this poor community participation are fear on the part of the citizens of being noted as police informants by hoodlums; certain negative beliefs about the police; risks of favouritism, nepotism and development of corrupt networks due to police closeness with the people, etc. Moreover, poor system quality and noncompliant system interface may as well contribute to factors

that may tend to inhibit the effective realization of the vision of the OCPH.

The goal in this paper is to present a methodical approach to a community centred user interface design for an Online Community Policing Hub (OCPH). Undeniably, every system user requires a user interface that is tolerant, consistent and compliant. According to Galitz (2007), "the goals of interface design are simple: to make working with a computer easy, productive, and enjoyable." Consequently, the issue of system user interface should not by anyway be trivialised in a system of this nature that involves a community of various users of different ages, technical experiences, health status and other human factors. The system targets a user interface that will be tolerant, learnable and compliant with even the less technical users without being boring to the experienced users.

Furthermore, the usability of any software-based system is a metric function of its user-friendliness, interactivity and simplicity measured from the users' viewpoints. Pressman (2010) defined usability as "the degree to which a software is easy to use as indicated by the following sub-attributes: understandability, learnability, operability." In ISO 9241-11, Usability is defined as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." For this to be possible, the user interface must portend the users' mental model of the system. The usability of a software product is a major concern of software ergonomics. Ergonomics is derived from two Greek words; "Ergon," meaning work and "nomois" meaning natural laws. The International Ergonomics Association (IEA,2003) defines "ergonomics (human factors) as the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimize human well-being and overall system performance." Simply put, ergonomics is the study of how to make a product or a process comfortable, efficient and appear natural.

Consequently, in this paper, a methodical approach to system user interface design known as the Pure-Emic User Interface Design (PEUID) approach is adopted for the interface design for the Online Community Policing Hub (OCPH). "Emic" is a term often used by anthropologists in referring to the study of culture based on the people's perspective. In addition to the 'emical' nature of PEUID are the following underlying guidelines for achieving a user-defined user interface for the proposed system: interface consistency, interface forgiveness and interface adaptability. The approach involves of Software Requirement Engineering (SRE) and Software Ergonomic Engineering (SEE) in ensuring that a system that befits the environment; stakeholders requirements, skills and health status is realised. In addition, a WYSIWYG (What-You-See-Is-What-You-Get) prototype of the system interface is employed to facilitate the designer's in-depth understanding of the users' perception of the system. The prototype undergoes series of evaluations, analyses and modifications until the users' resultant mental model is finally represented in the prototype.

Finally, the arrangement of the rest of the paper is such that section two presents a review of relevant literatures. Description of the online Community Policing Hub (OCPH) is presented in section three. In section four, the user interface design methodology for the online community policing hub (OCPH) is presented. Lastly, the conclusion is presented in section five.

2. REVIEW OF RELEVANT LITERATURES

2.1 Online Community:

An online community is a virtual platform that provides communication tools and technologies to facilitate interaction among people who wish to share information without having to meet one another face-to-face. It may as well serve as a supplemental medium of communication among people who may have known one another in real life. Furthermore, the growth of an online community is underpinned by the relative interests of the members of the online community. Amy Jo Kim (2000) defined an online community as "a group of people with a common purpose, interest, or activity, who get to know each other better over time." According to Howard Rheingold, " a virtual community is a group of people who may or may not meet one another face to face, and who exchange words and ideas through the mediation of computer bulletin boards and networks." Online community is categorised into the following: Community Of Practice (COPs)-where individuals share the same profession; Community Of Circumstance (COC)-where individuals share a personal situation; Community Of Purpose (COP) – where individuals share a common objective or purpose; Community Of Interest(COI)- where individuals share a common interest. Irrefutably, critical observations of these categories of online community will reveal that interest is the underlined factor and determinant of participation of members in any online

community.

2.2 Community Policing:

Dempsey and Forst(2008) opined that "Community policing is a strategy of crime management that deals with the basic causes of crime with the view to developing and applying longer term solutions to resolving issues through improved police community partnership and communication." According to Weigand (1997), "The police are the public and the public are the police; the police being only members of the public who are paid to give full time attention to duties which are incumbent on every citizen in the interest of community welfare and existence." The traditional policing has three operational pillars: the pillar of random or unstructured routine community patrols, usually within a designated geographical location; the pillar of rapid response to calls from community residents; and the pillar of retroactive past crime investigations (Godwin et al, 2009). However, community policing is a proactive "approach toward crime that addresses the underlying causes of crime and endeavours to apply long term problem-solving to issues through improved police-community partnerships and communications" (Dempsey and Forst, 2008). In other words, the traditional policing is incident-driven (Goldstein,1997) while community policing is cause-driven. Weigand(1997) suggests that "the police are the public and the public are the police; the police being only members of the public who are paid to give full time attention to duties which are incumbent on every citizen in the interest of community welfare and existence". Chene(2012) opined that community policing comprises of three key components: community partnership, organisational transformation and problem-solving. This synergistic approach to policing is tailored to the following goals:

(a) creation of a conducive environment where everyone can particpate in curbing crimes

(b) maintenance of trust between the citizens and the law enforcement agencies

(c) development of a framework that will make it convenient for the citizens to relate information pertaining to possible terrorists' threats and infrastructure vulnerabilities

(d) efficient anaysis of information from the citizens and the development of the optimal response strategy. Moore (1992) asserts that thought and analysis is fundamental to problem-oriented policing in order to effectively respond to the cause of the problem

(e) Integration of the community policing philosophy into the mission statement of the law enforcement agencies.

3. Description of the Online Community Policing Hub (OCPH)

3.1 The Concept Of Online Community Policing Hub, (OCPH)

In view of the rapid and unprecedented adoption of online social networks and their attendant online communities, attention of social workers and community development experts, researchers, and practitioners have turned to social networks and online communities as tools and strategies for facilitating effective participation and collaborations of the target stakeholders. In this case, an online community is defined as a group of people who are tied together by a common interest, purpose, goal, practice, etc. Hence, the centre of attraction to an online community is the interest, the purpose or the goal that the members share or will stand to achieve either collectively or individually. This paper extends the idea of social networks and their attendant online communities to include online community hub. Specifically, an Online Community Hub (OCH) is a collaborative virtual platform on the web where the entire people, institutions, technologies, tools, resources and service delivery frameworks that are relevant for any community are made visible and accessible. Community Policing Hub (OCPH) is an Online Community Hub where the shared community interest, purpose or goal is community policing. A generic community hub is depicted in Fig. 1.

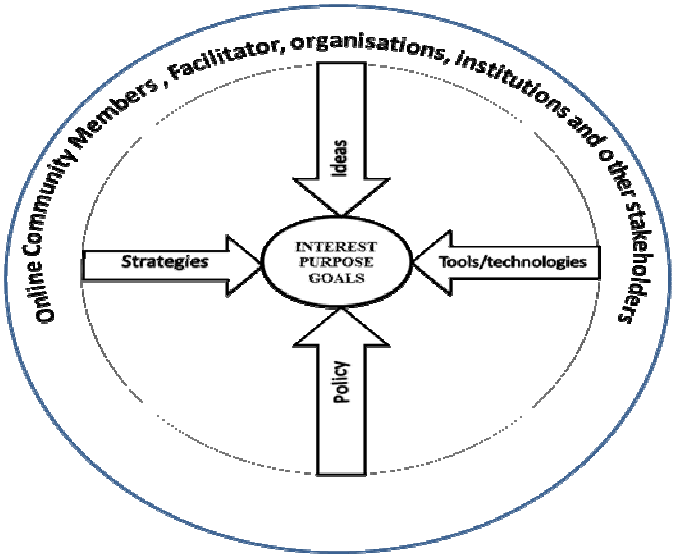

Fig. 1: Generic Community Hub

3.2 Context Model Of Community Informatics Social Network System (CISNS)

The CISNS was conceptualized by Ozuomba et al (2013) as depicted in Fig. 2. Essentially, SNWA when tailored and applied to facilitate local community development purpose and processes becomes a part of Community Informatics Social Network System (CISNS). The model puts into consideration the people and institutions, as well as the political, economic, socio-cultural, technical, legal and other environmental factors that affect may affect the system. The model consists of two broad categories of information; the environment/context information and the online community information. The context information lays emphasis on contextual issues and the need to tailor social technologies to the situated context of use in the various localities where the system operates .The online community information includes the SNWA which supports the purpose, policies, contents, technologies and people that make up the online community.

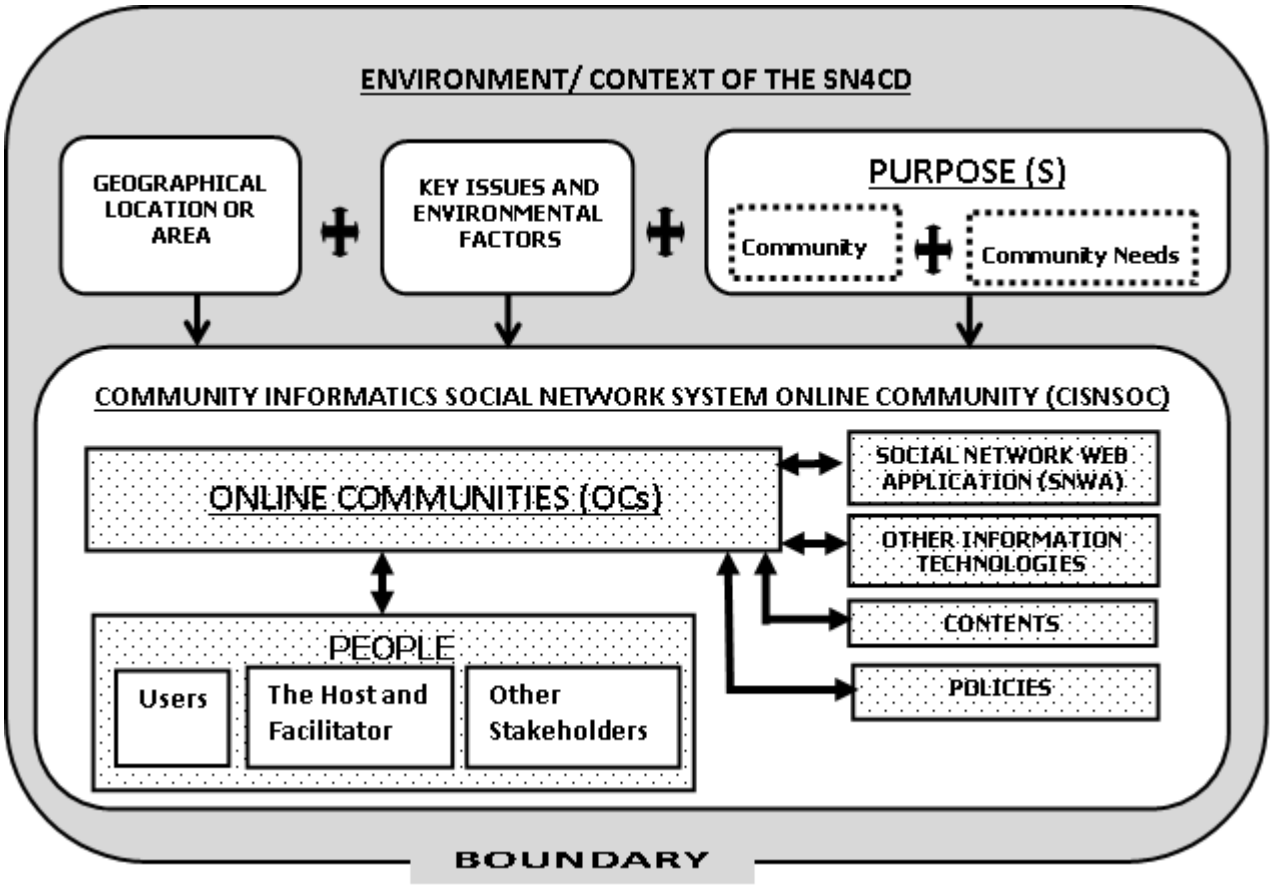

Fig 2: Context Model Of Community Informatics Social Network System (CISNS)

3.3 *The Conceptual Framework Of The Community Policing Hub (OCPH)*

The conceptual framework of the OCPH is presented in Fig. 2. Framework of OCPH in Fig. 3 shows the diverse stakeholders of the OCPH who can access and participate in the system through the various technologies that it supports. The facilitator initiates and drives the community policing goals and objectives by moderating the connection, interaction and activities of the various users groups or stakeholders in the OCPH. In order to foster active participation of the expected diverse user groups, the system requires a user interface that will be tolerant and compliant with the health status, age and level of technical experience of each user. Thus, extensive Software Requirement Engineering (SRE), Software Ergonomic Engineering (SEE) and the Pure-Emic User Interface Design (PEUID) are used in this paper to develop suitable user interface for the OCPH.

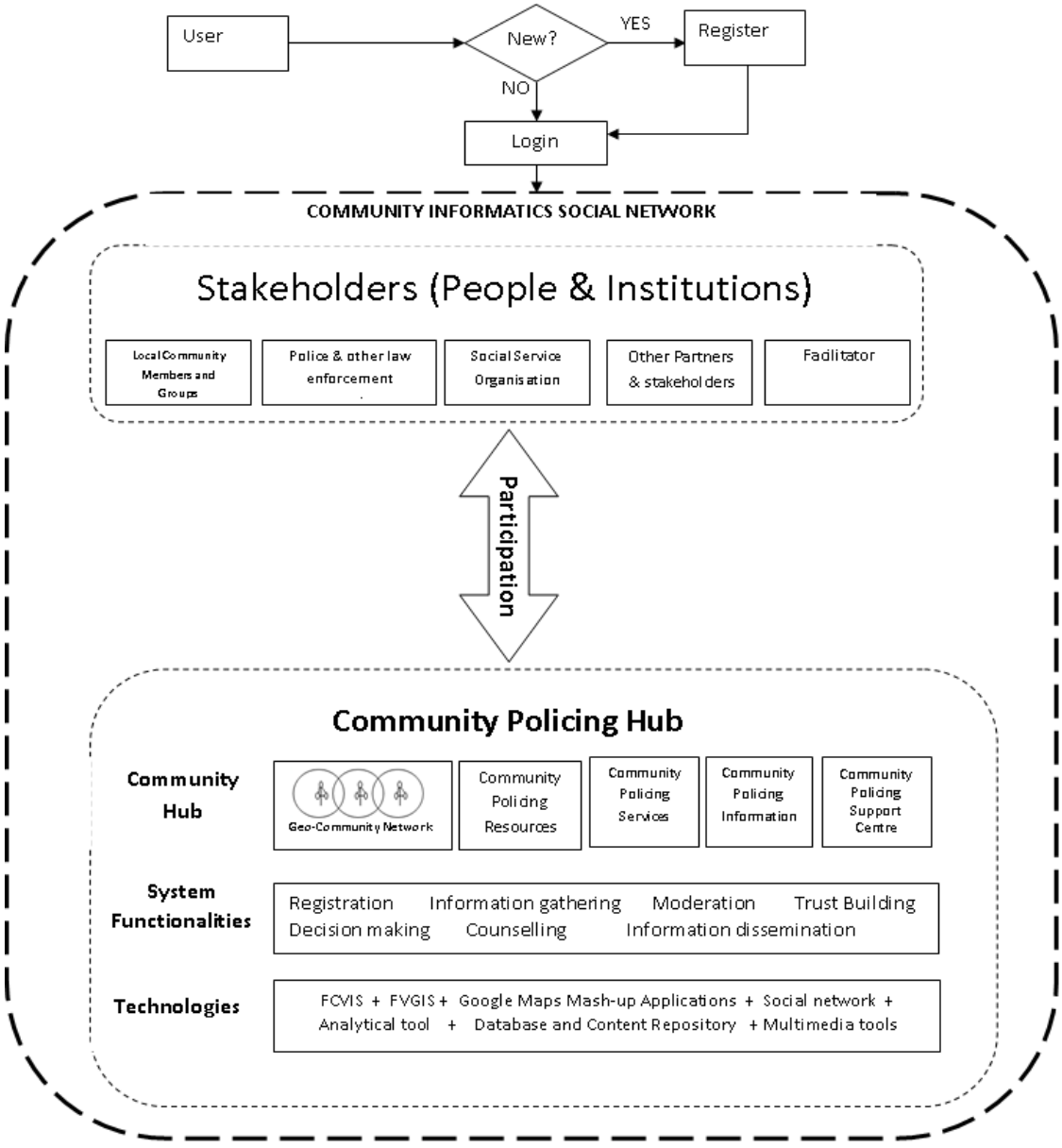

Fig.3: Conceptual Framework of OCPH as a part of Community Informatics Social Network, CISN

4. Design Methodology for the User Interface of the Online Community Policing Hub (OCPH)

4.1 *Software Requirement Engineering (SRE)*

In order to develop suitable user interface for the OCPH, Software Requirement Engineering (SRE) is conducted to enhance the understanding of the system functional and non-functional requirements. The system functional requirements include all properties of the system that a user can use to achieve specific goals while the non-functional requirements include specific properties of the system such as system performance, efficiency, operability, usability, etc that characterise the system quality. Interview, questionnaire, focus group discussion, and low fidelity prototyping were used to elicit the users' and system's requirements. The requirements gathered so far, are analysed, evaluated until a satisfactory requirement model or specification for the system is realised. The Non-functional and the functional requirements for the system are provided in Tables 1 and 2 respectively.

Table 1 Functional Requirements Of The System

FUNCTIONAL REQUIREMENTS		
S/N	Requirement /Modules	Requirement Description
1.	Crime Report	This module allows users to report both emergency and non-emergency crime information to the facilitator. • The Emergency crime reports category provides faster, secured and free way of reporting crimes that require immediate attentions. Toll-free anonymous hotlines are provided for easy communication of crimes info to the facilitator. • The non-emergency crime reports category provides crime reporting techniques for crimes that do not require immediate attention. These crimes are reported by the aid of an incident report form. This form supports multimedia message, and allows the reporter to send the coordinate of the incident area for crime mapping.
2.	Missing Persons/Things	This system module permits users to appeal for information about the whereabouts of lost persons or properties as well as to report lost but found persons or properties. The pictures as well as other necessary descriptions of the persons or things that are lost or found are provided as guides.
3.	Help-Me	The 'HELP-ME' module presents rehabilitation, counselling, support and protection opportunities to community members who wish to renounce their evil gangs, addictions, anti-social behaviours, etc. A well-structured 'HELP-ME' form is provided for collection of vital information from such persons, who are availed with the services of rehabilitation centres and other partnering experts depending on the area of help.
4.	Partnership	The system must be flexible to correction of defects, integration of new technologies and enhancement of This module provides partnership opportunities to law enforcement agencies, churches, social service organisations, companies, NGOs, businesses, institutions and other stakeholders. The module is categorized into: • Inquiry: This allows the intending partners or sponsors to ask questions about terms, conditions and also visualize necessary programmes, schemes, activities and events where their sponsorships and supports may be needed. • Application: This provides application forms for the partners to sign up their memberships or partnerships.
5.	Discussion Forum	This is a collaborative platform where the community members and other users can meet, collaborate and exchange ideas using Instant Messaging(IM) and other social networking services. The discussion forum is categorized into Crime Chat Forum and Public Chat forum. • The Crime chat forum allows a user to appear as unknown or with an alias in order to keep him/her unknown from other users. This platform

		is the best for discussions pertaining to crimes in the community. • The public chat forum is mainly to build active community networks and trust among the community members. The community members meet, know one another and discuss other personal issues that may not be crime related.
6.	Evaluation	The impact assessment of this system on the community is achieved through this module. The module provides a 'feedback questionnaire' which enables the community members to state their expectations as well as the areas of deficiencies of the system. The information collected are collated and the results are used as a veritable tool for decision support.
7.	Crime Info Appeal	This module enables the police and other law enforcement agencies to appeal for certain crime information and information about most wanted persons. It also helps the facilitator to verify more about certain crime reports. • The crime appeal form is provided for this purpose. This module supports multimedia message which enables the pictures of the most wanted persons to be displayed for identifications. • Users can view the appeal, make their comments or use the communication channels provided in the crime report module to relate the info which they feel should be private.

Table 2 Non Functional Requirements Of The System

NON-FUNCTIONAL REQUIREMENTS		
S/N	Requirement	Requirement Description
1.	Reliability	The system services shall have an availability of 99%. This implies that out of every 100 requests for these services 99 must be available and produce reliable results.
2.	Security	Unauthorised access to the system and its data is not allowed.
3.	Usability	The system must have: • Well-structured user manuals • Informative error messages • Help facilities • Well-informed graphical user interfaces
4.	Maintainability	The system must be flexible to correction of defects, integration of new technologies and enhancement of the system functionalities
5.	Performance	• The system should be able to support a large user base at any time. • The system will be designed to process every incoming transaction in 1 second or less.

4.2 Software Ergonomic Engineering (SEE) for the System

Software Ergonomic Engineering (SEE) is an approach employed by a software developer or designer in ensuring that the those human factors that may affect a system's usability, "comfortability", "learnability", efficiency as well as the users health are well addressed. SEE begins with the issuance of a Software Ergonomic Questionnaire (SEQ) for the purpose of gathering the necessary ergonomic data from the users. A model of a SEQ is presented in Fig. 4.

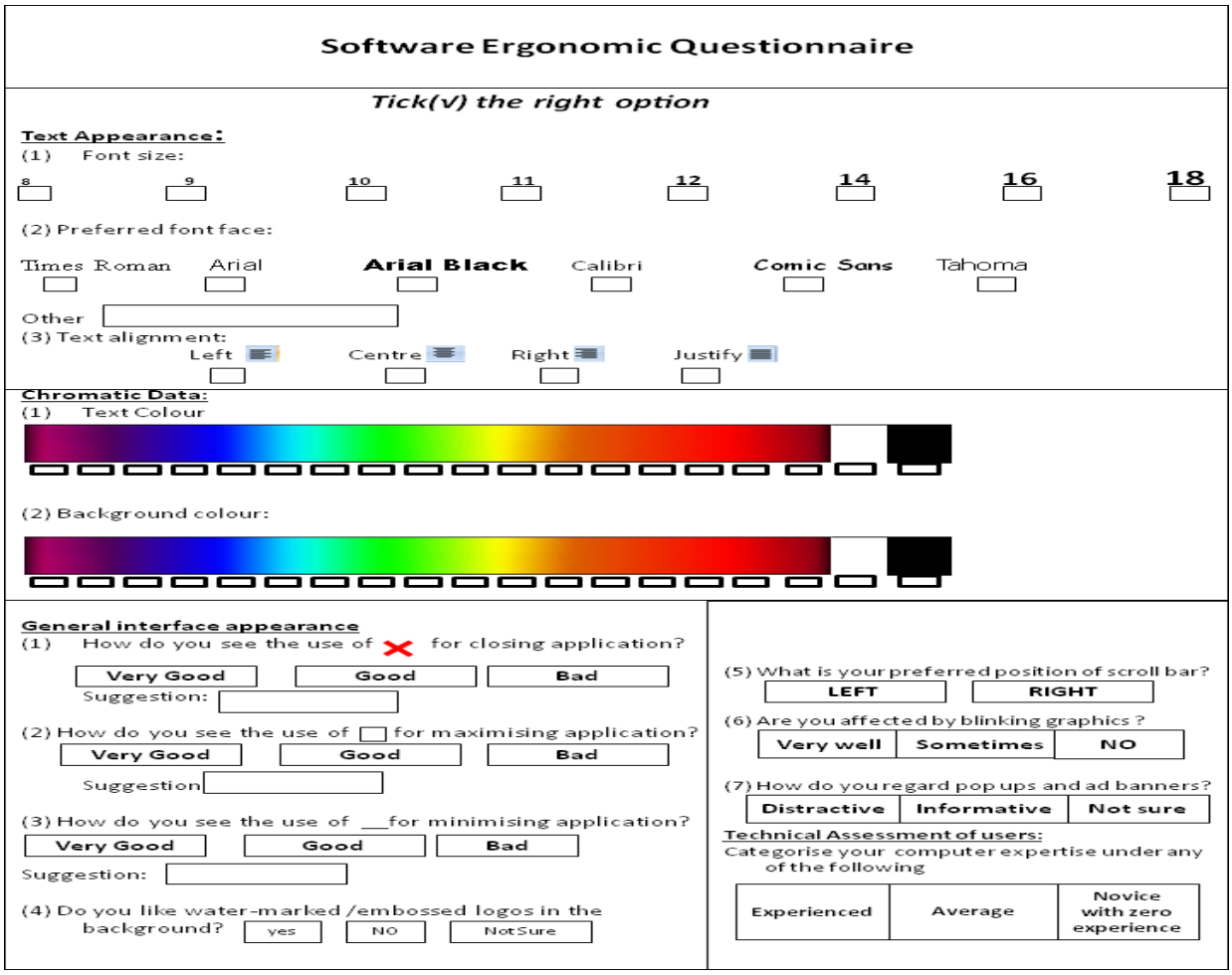

Fig. 4: A model of a SEQ

The information captured by the SEQ is analysed and triangulated in the first stage of the interface design – interface analysis. Focus group discussion and meetings can equally be conducted for further clarification and resolution of conflicting data. Moreover, a WYSIWYG-based prototype is equally deployed before the final interface design in order to explore further ergonomic data that might be omitted in the SEQ. The interface design methodology is presented in next section.

4.3 The Pure-Emic User Interface Design (PEUID) approach

The activities in the Pure-Emic User Interface Design (PEUID) approach include interface analysis, prototyping, user evaluation, evaluation result analysis by the designer and prototype modification. Fig. 5 represents the PEUID model showing the algorithmic implementation of the activities therein as well as the deliverables that are realized for each activity.

Interface analysis encompasses all the activities that are necessary for understanding the users' perceptions (mental model) of the system. Use of SEQ, focus group discussions and interviews are used for this purpose. Besides, the users are categorized based on their technical capabilities. Understanding the users' mental model for the proposed system will serve as a guide for developing a prototype for the system. In this work, a WYSIWYG prototyping is used for this purpose. The prototype is presented to the stakeholders for evaluation. The result of the evaluation is studied and analysed by the designer in order to pin down the limitations. Based on this understanding, the prototype is modified to accommodate the users' expectations. These processes keep on iterating until a final and satisfactory prototype is produced for the user interface design.

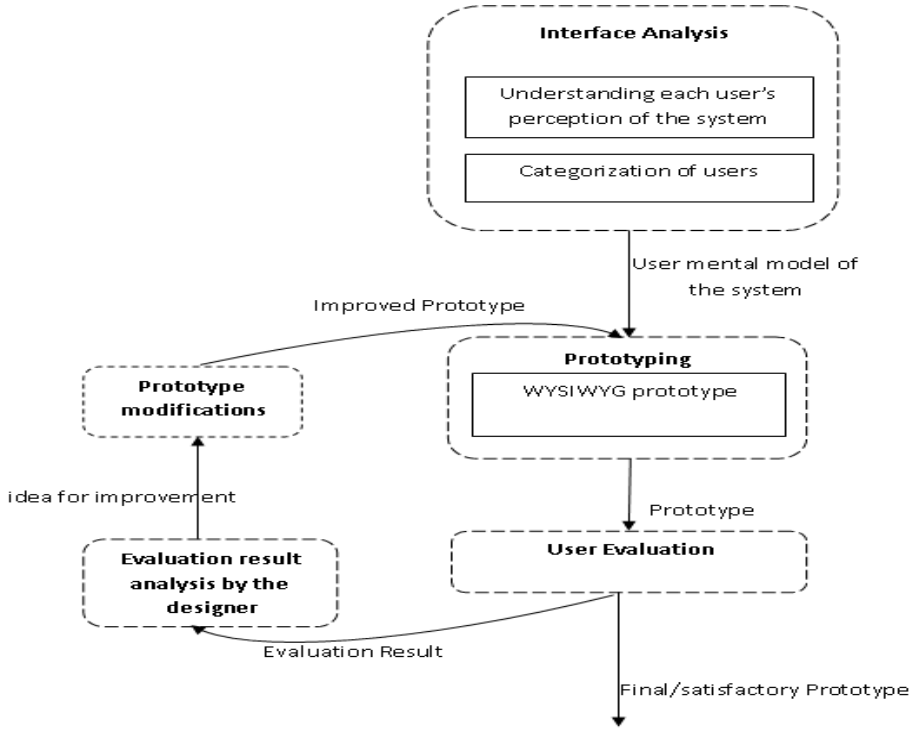

Fig. 5: The PEUID Model

A sample of a WYSIWYG prototype is presented in Fig. 6. The prototype depicts the developer's perception of the system based on the information gathered through SRE and SEE. The positions of the system elements or components, background colour, text colour, etc are shown in the prototype in order to understand what the stakeholders actually want from the system. The prototype is improved until a more satisfactory prototype is achieved for the system design.

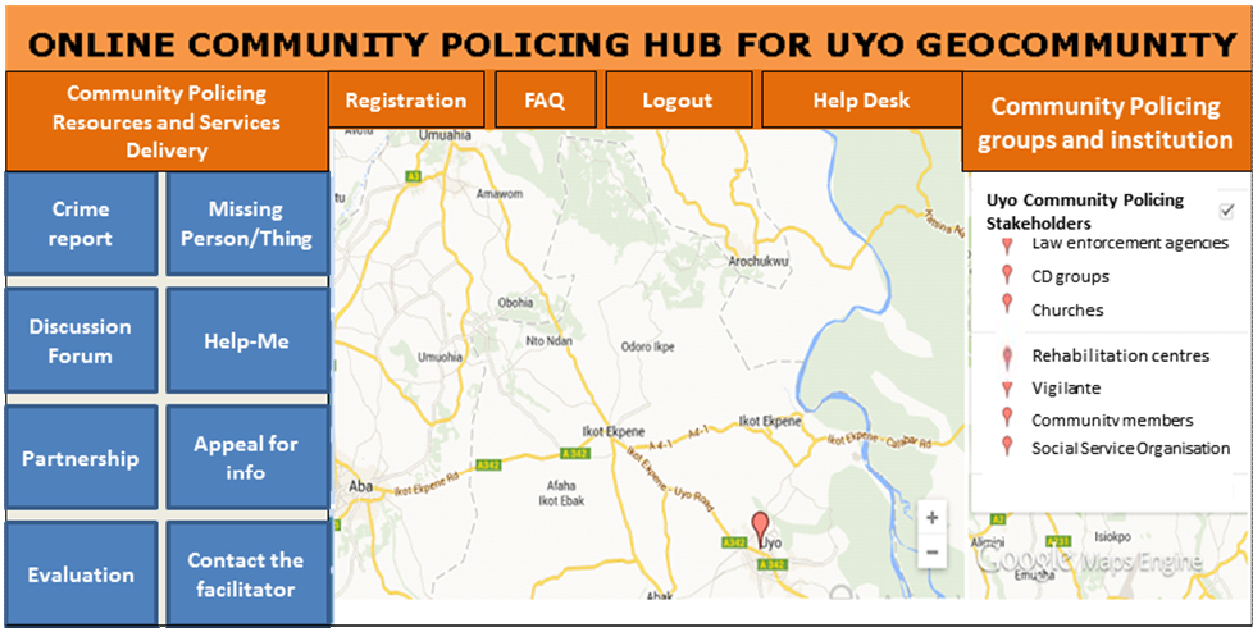

Fig. 6: A WYSIWYG prototype showing the Home page of the OCPH

5. Conclusion

In this paper, Pure-Emic User Interface Design (PEUID) methodology tailored to developing an interactive and user compliant interface for an Online Community Policing (Hub) is presented. The PEUID methodology

employed knowledge from devise fields such as ergonomics, cognitive psychology, anthropology and software engineering in ensuring the usability of the system for the diverse target users groups. Specifically, the PEUID approach seeks to capture and effectively utilise the users' mental model of the system in the user interface design. The PEUID is preceded by extensive Software Requirement Engineering (SRE) and Software Ergonomics Engineering (SEE). Finally, a model of Software Ergonomics Questionnaire (SEQ) and PEUID model are also presented.

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